SECTION 6

DEVELOPMENT AND SCREENING OF ALTERNATIVES

6.1 INTRODUCTION

6.1.1 The purpose of the feasibility study (FS) is to develop and evaluate cleanup action alternatives to enable a cleanup action to be selected for the site. This section presents the development and description of cleanup action alternatives that are considered for this FS. This section also presents the initial screening of cleanup action alternatives to eliminate alternatives that do not meet the requirements specified in MTCA (WAC 173-340-350).

6.1.2 Alternatives retained from the initial screening will be evaluated further in Section 7 consistent with the criteria specified in MTCA (WAC 173-340-360). This evaluation will determine the most practicable permanent solution to reduce explosive safety risk posed by the different MEC sites located within Camp Bonneville. As described in Section 4, a number of these former MEC sites pose an explosive safety risk to the public.

6.2 DEVELOPMENT OF ALTERNATIVES

6.2.1 Consistent with MTCA (WAC 173-340-350), the FS shall include the following:

- Alternatives that are protective to human health and environment by eliminating, reducing, or otherwise controlling risks posed by the site;
- A reasonable number and type of alternatives based on the characteristics and complexity of the site, including current site conditions and physical constraints;
- At least one permanent cleanup action alternative as defined in MTCA (WAC 173-340-200) to serve as a baseline against which other alternatives shall be evaluated for the purpose of determining whether the cleanup action selected is permanent to the maximum extent practicable;
- Alternatives that consist of one or more cleanup action components, including, but not limited to: components that remove MEC from the site; provide for on-site or offsite demolition and disposal of MEC; and, on-site isolation of MEC with engineering and institutional controls; and

- Alternatives that may include remediation levels to define when particular cleanup action components will be used. Alternatives may also include different remediation levels for the same component.

6.2.2 Based on the above requirements, six alternatives, including the no further action alternative, were developed for consideration at Camp Bonneville. The remaining five alternatives are: institutional controls, MEC surface clearance, MEC clearance to frost depth (14 inches), MEC subsurface clearance, and excavation and restoration (E&R). The following sections describe these alternatives.

6.3 ALTERNATIVE DESCRIPTION

6.3.1 Alternative 1: No Further Action

6.3.1.1 No further action (NFA) means no cleanup action will be implemented to reduce the potential explosive safety risk posed by different sites located within Camp Bonneville. This alternative, if implemented, would involve the continued use of the site in its current condition. If the potential exposure and hazards associated with MEC are compatible with the current conditions and future use of the site, then the implementation of NFA would be warranted. NFA is included as a baseline alternative in this FS for comparison with the remaining alternatives.

6.3.2 Alternative 2: Institutional Controls

6.3.2.1 Institutional Controls (ICs) are measures undertaken to limit public exposure to residual explosives materials at Camp Bonneville. These preventive measures may include educational awareness and training programs, legally enforceable restrictions on future land use, and physical access controls. Clark County will have authority and responsibility for implementing and monitoring ICs. The ICs for this FS are developed consistent with MTCA (WAC 173-340-440). The following sections provide a brief description of the IC components that are considered for implementation at Camp Bonneville.

6.3.2.1 Access Control

6.3.2.1.1 Access controls limit future receptor usage of the site by implementing various restrictions or dedicating the property to compatible use. Access controls can take the form of signage, fencing, and land-use restrictions and/or regulatory control.

6.3.2.1.2 Signage describes a comprehensive sign posting system that entry to a site is prohibited, that activities within the property are restricted, and/or that the area has a history of past munition-related activity. For Camp Bonneville, it is recommended that the signs present both historic and current designations such as for roads and trails, the sign will be designed to communicate both past site usage activities and current / future site activities. For example, the signage would read “Artillery Range Road” with a sub-header of “Jogging Trail 8”.

6.3.2.1.3 Fencing provides a physical barrier to inadvertent future receptor entry. Enforcement of trespass restrictions will be more effective if fencing is present. The

construction / maintenance of fencing is recommended for specific sites at Camp Bonneville, both as a feature for beneficial economic purposes and also as an enforcement tool to deny access to the public to areas designated as off-limits. As with signage, fencing will also reinforce the link between appropriate access points and explosive safety.

6.3.2.1.4 Land use restrictions and regulatory controls dictate the type of development that will occur on a site and the methods in which that development occurs. Currently, the land use designation for Camp Bonneville is an institutional designation illustrated as "Tier 1 Forest" on the land use map. Future updates of the Clark County land re-use plan will reflect the site as recreation and park land uses. However, it will be still used for institutional purposes as the Clark County owns it.

6.3.2.2 Educational Awareness Program

6.3.2.2.1 Clark County will have the responsibility to educate the public and park visitors about the potential hazards associated with visiting and recreation activities on a former military installation. The education awareness programs of potential safety hazards will modify public behavior at Camp Bonneville. This education / awareness program should be implemented by Clark County and its stakeholder agencies that have interest in using the site. Behavior modification is dependent upon the awareness and personal responsibility of the site user. If there is open access to existing munitions-related site, there is negligible risk to a potential receptor if the individual's behavior is appropriate for the site conditions. For behavior to be appropriate, one must understand the situation and voluntarily react in a responsible manner.

6.3.2.2.2 Raising public education for the potential hazards that exist within the Camp Bonneville can be facilitated with local awareness programs such as land use controls and notifications during permitting. Restrictive covenants on the land uses of Camp Bonneville should be detailed in an official site plan and adopted by Clark County for enforcement. Restrictive covenants and site plan requirements for Camp Bonneville should be included in the update of the County and Regional Comprehensive Plan.

6.3.2.2.3 Clark County notifications should be sent through the permitting of utility connections, infrastructure construction, land surveying, timber harvesting, and related physical land disturbance tasks. Standard application forms and brochures that explain the procedures involved in the construction notification and building permit approval processes should be updated to reflect training and circumstances dealing with any munitions that may be present at Camp Bonneville. The standard permit application process of the City of Vancouver and Clark County should be amended to include information about the possibility of MEC hazards, and specific Camp Bonneville site plan information and restrictive covenants.

6.3.2.3 Printed Media Awareness Program

6.3.2.3.1 Munitions awareness and education, acknowledgement of the potential explosive safety risk involved, and reinforcement of the message will minimize the hazards of exposure to residual MEC at Camp Bonneville. The avenue recommended for this education and awareness of MEC is through printed media, in the form of brochures,

fact sheets, newspaper articles, and other information packages. The opportunity to disseminate information through the printed media is readily available and can be easily facilitated through the numerous media outlets in Metropolitan Portland. Through the use of printed media, park visitors, nearby property owners and residents within Clark County and the region can be informed about the potential existence of residual hazards within the former Camp Bonneville.

6.3.3 Alternative 3: Surface Clearance with Institutional Controls

6.3.3.1 Surface clearance will require clearance of MEC items located on the ground surface. Prior to performing any MEC clearance activities at the site, control points will be established by a land surveyor for the areas that will undergo surface clearance. UXO-qualified personnel will perform a magnetometer-assisted surface sweep to locate metallic objects. The sweep will be performed in fixed width intervals. During the surface sweep, metallic objects located on the ground surface will be identified as metallic scrap or MEC items and removed.

6.3.3.2 Metallic objects identified as MEC items during the surface clearance will be inspected to ensure its stability. During this inspection, a determination will be made whether the recovered MECitem can be moved. If a determination is made that the MEC item is not acceptable to move, then the OE will be destroyed in place. Otherwise, the item will be moved to a remote location for onsite destruction and disposal. If necessary, engineering controls will be used to minimize the need for evacuation of the public. Inert MD items will be removed from the area and transported offsite for disposal.

6.3.3.3 ICs (Alternative 2) will be implemented in conjunction with the MEC surface clearance to limit public exposure to possible residual explosives materials at Camp Bonneville.

6.3.4 Alternative 4: Clearance to Frost Depth (14 inches) with Institutional Controls

6.3.4.1 Clearance to frost depth at Camp Bonneville will require clearance of MEC items located on the ground surface and within 14 inches below the ground surface. Clearance to frost depth at Camp Bonneville is due to the published frost penetration depth of 14 inches and potential for the resulting frost heave of buried items at or above this depth. Based on the minimal amount of UXO recovered todate all being less than 18 inches below ground surface, it is anticipated that the majority of remaining UXO at the site is within this frost depth interval. MEC clearance activities at the site, control points will be established by a land surveyor for the areas that will undergo surface clearance. Brush clearing crews will clear sufficient undergrowth so that the MEC clearance crews can adequately perform their work. The brush clearance crews will be accompanied by UXO-qualified safety personnel.

6.3.4.2 Upon completion of land surveying and brush clearing, surface clearing will be conducted in accordance with Alternative 3. The clearance of surface clutter and MD scrap will enhance the discrimination capability of digital geophysical mapping (DGM).

6.3.4.3 Once the surface clutter is removed, DGM of the site will be performed to map metallic anomalies located below ground surface. The DGM will provide a permanent record of the geophysical mapping results. The DGM will be conducted with a metal detection device capable of locating metallic anomalies to the depth of clearance. The DGM data will be analyzed by a qualified geophysicist to identify subsurface metallic anomalies. "Dig sheets" will be created from these analyses to describe the positional locations of subsurface metallic anomalies.

6.3.4.4 Locations of the metallic anomalies identified on the dig sheets will be reacquired at the site for intrusive investigation. The intrusive investigation would require that each anomaly location listed on the dig sheets be excavated until the anomaly source is identified or until a clearance depth of 14 inches has been reached. During the intrusive investigation, engineering controls may have to be used to decrease the evacuation distance that will be required for conducting these intrusive investigations. Evacuation distances will be based on a reasonable worst-case scenario for the potential detonation of an ordnance item that could be found at the site. All non-essential personnel are evacuated based on this distance to maximize the safety of the operation. Metallic objects obtained during the intrusive investigations will be identified as metallic scrap or MEC items. The disposal of MEC items will be performed as described in the surface clearance alternative (Alternative 3).

6.3.4.5 ICs (Alternative 2) will be implemented in conjunction with the MEC frost depth clearance to limit public exposure to possible residual explosives materials at Camp Bonneville.

6.3.5 Alternative 5: Subsurface Clearance with Institutional Controls

6.3.5.1 Subsurface clearance will require clearance of MEC items to a specified depth based on the projected end use of the site and the resulting potential for exposure to MEC. Under this alternative, each anomaly will be intrusively investigated until the anomaly is identified or until the site-specific risk-based specified depth is reached.

6.3.5.2 Implementation of this alternative will involve land surveying and brush clearing operations as described in the clearance to frost depth alternative. This alternative will also involve a magnetometer-assisted surface sweep to remove all surface clutter which includes metallic scrap items and MEC items. The surface sweep will be performed by experienced UXO-qualified personnel. Any MEC items identified during the surface sweep will be disposed as described in Alternative 3.

6.3.5.3 Once the surface clutter is removed, digital geophysical mapping (DGM) of the site will be performed to map metallic anomalies located below ground surface. The DGM will be conducted with a metal detection device capable of locating metallic anomalies to the depth of clearance. The DGM data will be analyzed by a qualified geophysicist to identify subsurface metallic anomalies. Dig sheets will be created from these analyses to present the locations of subsurface metallic anomalies.

6.3.5.4 Locations of the metallic anomalies identified on the dig sheets will be reacquired at the site for intrusive investigation. The intrusive investigation would require that each anomaly location be excavated until the anomaly source is identified or

until the predetermined clearance depth has been reached. During the intrusive investigation, engineering controls may have to be used to decrease the evacuation distance that will be required for conducting these intrusive investigations. Evacuation distances will be based on a reasonable worst-case scenario for the potential detonation of a munition that could be found at the site. All non-essential personnel are evacuated based on this distance to maximize the safety of the operation. Metallic objects obtained during the intrusive investigations will be identified as metallic scrap or MEC items. The disposal of MEC items will be performed as described in the surface clearance alternative (Alternative 3).

6.3.5.5 ICs (Alternative 2) will be implemented in conjunction with the MEC subsurface clearance to limit public exposure to possible residual explosives materials at Camp Bonneville.

6.3.6 Alternative 6: Excavation and Restoration

6.3.6.1 Excavation and restoration involves excavation of the complete area for removing all metallic and MEC items located at the site. The default excavation depth for this alternative evaluation will range ten (10) feet based on the assumption that future reuse for Camp Bonneville is recreational. Under this alternative, prior to excavating any site soils all existing vegetation, including tree cover, will be cleared. No geophysical survey will be performed for this alternative. All the soils located at the site will be excavated to a depth of 10 feet and will be sifted to identify MEC items for proper disposal. The soils free of any MEC items will be reused at the site for backfilling the excavations. As a result of the process, this alternative will require extensive repair of all ecological damages during the MEC removal action. This alterantive is considered as the permanent cleanup action for this FS.

6.4 SCREENING OF ALTERNATIVES

6.4.1 MTCA (WAC 173-340-350) indicates that an initial screening of cleanup action alternatives be performed to eliminate alternatives that do not meet minimum threshold requirements as presented in MTCA (WAC 173-340-360) or if they are not technically possible to implement at the site. These MTCA minimum threshold requirements must be met by an alternative such that the alternative can be carried forward for further evaluation.

6.4.1 Protect Human Health and Environment

6.4.1.1 This initial screening requirement considers the overall protection each alternative provides to human health and the environment including the degree to which existing risks are reduced, the time required to reduce risk and obtain cleanup standards, the off-site and on-site risks resulting from the implementation of the alternative and the degree of improvement of the overall environmental quality. In the analysis of alternatives, this requirement will be utilized to evaluate whether the alternatives developed for this FS will reduce the potential for harm and the level of protectiveness at the site if the alternative is implemented, as compared to the existing baseline condition.

6.4.2 Comply with Cleanup Standards

6.4.2.1 Alternatives will be evaluated for this minimum threshold requirement to investigate if they comply with the cleanup standards. According to MTCA (WAC 173-340-700), a cleanup standard consists of cleanup levels and the locations where these cleanup levels shall comply at the site (points of compliance). Cleanup levels define the concentration of a particular substance which does not threaten human health or the environment.

6.4.2.2 MTCA Cleanup Regulation provides for methods (Method A, B, and C) to establish cleanup levels for hazardous substances found in soil, groundwater, and air. However, MTCA does not identify a cleanup level for MEC at residential or non-residential sites (Methods A and B, respectively) nor does it identify exposure factors for ordnance that could be used to develop a site-specific cleanup level (Method C).

6.4.2.3 Camp Bonneville site-specific cleanup standards (remediation levels and points of compliance) were developed based on the baseline risk assessment and proposed future land use. As the purpose of this FS report is to select a most practicable permanent solution for reducing public safety risk associated with MEC that may exist within Camp Bonneville, and since MTCA fails to describe the appropriate manner of assessing potential risk from MEC, site specific cleanup standards were developed to address explosive safety risk posed by different site types located within Camp Bonneville. Section 5 presented the development of site specific cleanup standards.

6.4.2.4 Cleanup action standards were developed for those site types at Camp Bonneville that pose an unacceptable MEC hazard exposure risk: Firing Points, OB/OD Areas, and Target Areas. The remediation level at these sites is the condition where the likelihood for MEC source and receptor interaction is negligible. The points of compliance are defined based on those areas (x, y, and z) where the potential MEC source and receptor interactions are likely to occur.

6.4.3 Comply with State and Federal Laws

6.4.3.1 This requirement evaluates whether alternatives comply with state and federal laws that pertain to the site. Applicable state and federal laws will include legally applicable requirements and those requirements that are relevant and appropriate. According to MTCA (WAC-340-710), legally applicable requirements are cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations adopted under state or federal law that specifically address a hazardous substance, cleanup action, location or other circumstances at the site. Relevant and appropriate requirements are those cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state or federal law that, while not legally applicable to the hazardous substance, cleanup action, location, or other circumstance at a site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site.

6.4.3.2 Three categories of ARARs are evaluated for the Camp Bonneville. These ARAR categories are: chemical-specific ARARs, location-specific ARARs, and action-specific ARARs. Chemical-specific ARARs are health-based or risk-based numerical

values that establish the acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Location-specific ARARs generally are restrictions placed upon the concentration of hazardous substance or the conduct of activities solely because they are in special locations. Some examples of special locations include flood plains, wetlands, historic places, and sensitive ecosystems or habitats. Action-specific ARARs are usually technology or activity-based requirements or limitations placed on actions taken with respect to cleanup actions, or requirements to conduct certain actions to address particular circumstances at a site. Table 6.1 summarizes the ARARs identified for Camp Bonneville.

6.4.3.3 No chemical-specific ARARs were identified for the cleanup action alternatives because the primary concern of this project is to reduce public safety risk associated with MEC that may exist within Camp Bonneville. After selected cleanup actions are implemented, an evaluation of potential chemical contamination, if warranted, may be conducted as part of an environmental investigation.

6.4.3.5 Several location-specific ARARs have been identified for this RI/FS. These ARARs shall be reviewed prior to implementation of cleanup action alternatives at Camp Bonneville. The location-specific ARARs include protection of historical and archeological resources, protection of Native American interests and other cultural issues, protection of wildlife and habitat resources (including endangered species, fish, migratory birds, and wetlands), and management considerations for forest and range lands. Table 6.1 lists the location-specific ARARs with their legislative citation and a brief description of the requirements.

6.4.3.6 One action-specific requirement, Army Regulation (AR) 385-64, specifies that safety measures be taken for handling of MEC. Moreover, DoD 6055.9-STD requires that specialized personnel be employed to detect, remove, and dispose of ordnance. This standard also defines safety precautions and procedures for the detonation or disposal of ordnance.

6.4.4 Provide Compliance Monitoring

6.4.4.1 This requirement evaluates whether the proposed remedial alternatives provide compliance monitoring. MTCA requires compliance monitoring be performed after cleanup action has been implemented at the site. As described in MTCA (WAC 173-340-410), compliance monitoring includes three types of monitoring: protection, performance, and confirmational monitoring.

6.4.4.2 Protection monitoring confirms that human health and the environment are adequately protected during the implementation of the cleanup action. Performance monitoring confirms that the cleanup action has attained cleanup standards and, if appropriate, remediation levels or other performance standards such as construction quality control measurements or substantive requirements of other laws. Confirmational monitoring confirms the long-term effectiveness of the cleanup action.

TABLE 6.1
POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Activity	ARAR/TBC	Citation	Applicability or Relevance
Chemical-Specific			
Any residual chemical contamination of a hazardous nature will be addressed by the efforts being conducted at the site for Hazardous, Toxic, and Radioactive Wastes (HTRW) issues. Therefore, no chemical-specific ARARs apply.			
Location-Specific			
Location of an action within an area where it may cause irreparable harm, loss or destruction of significant artifacts or historic landmarks	Section 106 of the National Historic Preservation Act, as amended	36 CFR 800 23 CFR 771 36 CFR 60 36 CFR 63 Executive Order 11593	During removal action, any material that may be considered of archeological or historical value will be reported pursuant to requirements
	Preservation of Historical and Archeological Data	16 USC 469a 36 CFR 66	Preserve historical and archeological data from loss or destruction
	Protection of Wetlands	33 CFR 320 et. seq. 23 CFR 777 Executive Order 11990	Requires Section 404 Clean Water Act permit for disposal of dredged or fill material in waters of the United States, including wetlands
	Endangered Species Act of 1973, as amended	16 USC δ 1531 et. seq.	Requires that authorized actions do not jeopardize the continued existence of endangered or threatened species, or their habitats.
	Native American Graves Protection and Repatriation Act (NAGPRA)	43 CFR Part 10	Requires consultation with Native Americans prior to the excavation of ancestral remains and related objects to establish appropriate disposition of these items
	Archaeological Resources Protection Act	43 CFR Part 7 (also: 36 CFR Part 296, 32 CFR Part 229, and 18 CFR Part 1312 - same regulations)	Requires a permit to excavate, remove, or otherwise alter any archaeological resource
	Act for the Preservation of American Antiquities	16 CFR 251.50-64 43 CFR Part 3	Requires a permit for the examination of ruins, excavation of archaeological sites, and gathering of objects of antiquity
	Public Rangelands Improvement Act of 1978	43 U.S.C. §§ 1901-1908, October 25, 1978	Requires development updating and maintenance of an inventory of range conditions and a record of trends of conditions on the public rangelands

TABLE 6.1
POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CON'T.)

Activity	ARAR/TBC	Citation	Applicability or Relevance
Location-Specific (Con't)			
	Wilderness Act of 1964	PL 88-577 16 U.S.C. 1131-1136	Requires preservation and protects wilderness areas in their natural state for present and future generations
	National Forest Management Act of 1976	PL 94-588	Requires preparation of resource management plans that provide for multiple-use and sustained-yield of products and services; portions of study area within NFS land are included in plans
	Migratory Bird Treaty Act of 1918	16 U.S.C. 703-712	Protects migratory birds, nests and eggs from disturbance, damage, or movement from place to place
	Bald and Golden Eagle Protection Act of 1940	16 U.S.C. 668-668d, 54 Stat. 250) as amended -	Prohibits, except under certain specified conditions, the taking, possession and commerce of bald eagles
	Fish and Wildlife Coordination Act of 1958	PL 85-654 16 U.S.C. 661-667d	Requires measures for conservation, maintenance and management of wildlife resources
	Sikes Act of 1960, 1974 and Amendments 1986, 1997 Title XXIX.	PL 86-797, PL 93-205, PL 99-561, PL 105-85	Program of planning for, and the development, maintenance, and coordination of, wildlife, fish, and game conservation and rehabilitation in each military reservation
	Fish and Wildlife Conservation Act of 1980	PL 99-645	Encourages states to develop conservation plans for non-game fish and wildlife of ecological, educational, aesthetic, cultural, recreational, economic or scientific value; requires determination of the effects of environmental changes and human activities on same
	Lacey Act Amendments of 1981	PL 97-79 16 U.S.C. § 701, May 25, 1900.	Authorizes the Secretary of the Interior to adopt measures to aid in restoring game and other birds in parts of the U.S. where they have become scarce or extinct and to regulate the introduction of birds and animals in areas where they had not existed.

TABLE 6.1
POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CON'T.)

Activity	ARAR/TBC	Citation	Applicability or Relevance
Location-Specific (Con't)			
	Protection and Enhancement of Sacred Indian Sites, 1976	Executive Order 13007	Provides for the protection of sacred Indian sites.
	CERCLA Procedures for Planning and Implementing Off-Site Response Actions	40 CFR 300.440	Outlines the management requirements for off-site response actions.
	Archaeological Resources Protection Act	16 CFR 1312 32 CFR 229 36 CFR 296	Requires preservation and protection of archeological resources from physical disturbance.
Action-Specific			
	EPA RCRA Subpart X-Miscellaneous Units	40 CFR 264 Subpart X	Outlines the management requirements of OB/OD areas during a removal action.
	Clearance of Explosive Hazards and Other Contamination from Proposed Excess land and Improvements	32 CFR Part 644.516-535	Outlines certain requirements and responsibilities related to the clearance and transfer of excess land.
	Occupational Safety and Health Act	29 USC 651-667	This act authorizes OSHA to set and enforce safety and health standards to promote worker safety during OE removal actions.
	RCRA Military Munitions Rule	62 CFR 6654	This rule outlines the identification and management of residual munitions.
	Community Environmental Response Facilitation Act (CERFA)	CERCLA Section 120(h)	Obtains certain requirements for notice to public and community during response actions.
	CERCLA Review Requirements	CERCLA 121(c)	Addresses the recurring review requirements where wastes left in place.
	Environmental Effects of Army actions	AR 200-2 (NEPA-40 CFR 1500-1508)	An Environmental Assessment (EA) or an Environmental Impact Statement (EIS) would be required to ensure that commercial or residential development would not have an adverse impact on the environment.

TABLE 6.1
POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CON'T.)

Activity	ARAR/TBC	Citation	Applicability or Relevance
Action-Specific (Con't)			
	Environmental Protection and Enhancement	AR 200-1	Prescribes Army policies, responsibilities, and procedures to protect and preserve the quality of the environment.
	Safety and Health Requirements on Conventional Ordnance and Explosives Activities	ER 385-1-95	Identifies safety and health responsibilities and procedures for OE response actions.
	Ordnance and Explosives Response	EP-1110-1-18	Establishes roles and responsibilities for USACE elements in managing and executing OE response actions.
To Be Considered (TBC) Criteria			
	DoD Ammunition and Explosive Safety Standards	DoD 6055.9-STD	Primary DoD regulation that requires UXO cleanup of DoD lands prior to transfer.
	EPA Guidance for Conducting Non-Time Critical Removal Actions Under CERCLA	EPA/540.R-93/057	Guidance for conducting removal and response actions under CERCLA.
	Explosives Safety Submissions for Removal of Ordnance and Explosives from Real Property	DDESB Memorandum	Memorandum that includes the policy for submitting explosive safety submissions for removal actions.
	Explosives Safety Policy for Real Property Containing Conventional Ordnance and Explosives	Letter, Dept. of Army	This letter prescribes the policies and procedures for explosives safety controls on real property containing MEC.
	Guidance for Consideration of ARARs During Removal Actions	EPA/540/P-91/011	EPA Guidance for considering ARARs during removal at a Superfund site.

6.4.4.3 The protection monitoring for ordnance related projects will require usage of UXO-qualified safety personnel to conduct MEC related activities at the site. This would include providing UXO safety training and UXO safety supervisory personnel to the land surveying, brush clearing, and geophysical survey crews. It also requires establishment of evacuation distances during the implementation of MEC clearance activities at the site. These distances will provide adequate protection to humans from potential explosive risk that may be posed by the site during the MEC clearance activities.

6.4.4.4 Performance monitoring for ordnance related projects will involve implementation of quality control measures. These measures may include conducting a geophysical survey on ten percent (10%) of the total area that has been subsurface cleared for MEC related items. This quality control monitoring will ensure that the implemented

MEC cleanup actions attained the required cleanup standards. The performance monitoring will also involve implementation of measures to verify that the cleanup action alternatives meet the ARARs.

6.4.4.5 Confirmation monitoring for this project will include preparation of an annual report to describe any MEC findings occurring at the Camp Bonneville site in the prior year and the management actions taken to address the explosive risk of such a potential find. This annual report will provide long-term effectiveness evaluation of the cleanup actions implemented at the site.

6.5 APPLICATION OF SCREENING CRITERIA BY ALTERNATIVE

6.5.1 This section discusses the performance of the six cleanup action alternatives relative to the MTCA screening criteria presented in Section 6.4. Alternatives that meet these criteria will be carried forward for further evaluation in Section 7. The cleanup action alternative evaluation presented in Section 7 will compare the MTCA-specified criteria for each of the alternatives for each of the different MEC and future use site types. Section 8 present the preferred alternative to reduce explosive safety risk for each of the different site types located within Camp Bonneville. The preferred alternative shall be the most practicable permanent solution as determined by the criteria specified in MTCA (WAC 173-340-360).

6.5.2 No Further Action (Alternative 1) does not provide overall protection to human health and environment, as it does not implement any cleanup action to reduce explosive safety risk at Camp Bonneville. Implementation of this alternative does not meet other minimum threshold requirements which include attaining the cleanup standards, complying with the ARARs, and providing compliance monitoring. Although, this alternative does not meet threshold requirements, it will be retained for further evaluation in Section 7 as a baseline alternative for comparative purposes only.

6.5.3 Implementation of ICs (Alternative 2) will meet the minimum threshold requirements for future use site types located within Camp Bonneville with negligible MEC safety hazards. ICs such as brochures and signage will provide the public with information of the past ordnance-related activities at Camp Bonneville. This increased public awareness / education will modify their behavior while performing activities at these sites. Behavior modification results in minimal receptor interaction and resulting exposure to residual MEC-related items. However, implementation of ICs alone will not attain all the threshold requirements for those MEC site types which possess an explosive safety risk. ICs will be effective at these site types when used in conjunction with an active cleanup action alternative (e.g., clearance to frost depth). ICs will be retained for further evaluation based on the attainability of minimum threshold requirements either by themselves or in combination with other cleanup action alternatives.

6.5.4 Surface clearance action with ICs (Alternative 3) will be effective in reducing the explosive safety risk by removing residual surface ordnance items that may be located at Camp Bonneville. This alternative will increase the level of protectiveness to the public using the site for non-intrusive purposes (e.g., hiking). In addition, the surface clearance alternative preserves environmental and ecological resources that may be

damaged or destroyed during implementation of Alternatives 4, 5 or 6. Implementation of surface clearance alone will not attain all the threshold requirements for those MEC site types that possess the greatest explosive safety risk or areas with proposed future intrusive activities. Surface clearance (Alternative 3) will achieve the cleanup standards in a reasonable time frame and will be retained for further evaluation based on compliance with minimum threshold requirements.

6.5.5 Clearance action alternatives with ICs (Alternative 4 and Alternative 5) will be effective in reducing the explosive safety risk by removing residual ordnance items that may be located at Camp Bonneville. These alternatives will increase the level of protectiveness to the public using the site. Selection of Clearance to frost depth (Alternative 4) or Subsurface Clearance (Alternative 5) will be based on the factors of documented MEC findings and future reuse plans for the specific site type. The removal actions involved with these alternatives should achieve the cleanup standards in a reasonable time frame. Implementing these cleanup action alternatives, however, may damage the ecological environment since it involves removal of the undergrowth (all but the largest trees will be removed) for accurate geophysical mapping. In addition to removal of vegetation, soil will be disturbed at the dig locations. Dependent upon the density of vegetation and the density of subsurface items removed, the existing habitat may be greatly impacted. In terms of habitat preservation, implementation of subsurface clearance action alternatives may not comply with the ARARs identified for the site. These cleanup action alternatives will provide compliance monitoring. Clearance to Frost Depth with ICs (Alternative 4) and Subsurface Clearance with ICs (Alternative 5) will be retained for further evaluation based on their compliance with minimum threshold requirements.

6.5.6 Excavation and restoration (Alternative 6) will involve excavation of all the site soils for a depth of 10 feet below ground surface. Prior to the excavation of site soils, all vegetation, including trees, will be removed. Excavated soils will be sifted for the removal of any MEC items. Soils free from MEC items will be placed back into the excavated areas. Upon completion of backfilling, these areas will be re-vegetated / restored to their original condition. Implementation of E&R alternative (Alternative 6) will be effective in reducing the potential for harm by removing MEC, and it provides for an increased level of protectiveness to the public using the site. Cleanup standards will be achieved by implementing this alternative at the site. However, implementing this cleanup action alternative will severely and irreparably damage the ecological environment since it involves total removal of all vegetation and disturbance of soils to a depth of 10 feet at the site. ARARs will not be complied by implementing this alternative since it will disrupt and destroy the wildlife habitat, totally disturb the wilderness areas from their natural state, and disrupt / destroy the habitat for migratory birds. This alternative will require decades for site restoration efforts to be completed. Despite not accomplishing the ARARs and requiring an exceptional restoration timeframe, the E&R alternative will be retained for further evaluation as a permanent cleanup action alternative since MTCA requires the FS include one permanent cleanup action alternative.